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METHOD FOR SHARPENING BEDKNIVES

1 BACKGROUND OF THE INVENTION

2 This invention concerns sharpening apparatus and more
3 particularly bedknife grinders for sharpening the bedknife used
4 with reel type mowers.

5 Reel mowers consist of a set of helically formed blades
6 arranged in a generally cylindrical shape. The blades are rotated
7 against a bedknife closely positioned along the perimeter of the
8 reel blade array. Grass being mowed is sheared as each segment of
9 the blades rotate to progressively reduce the clearance with the
10 bedknife, shearing the grass blades between the blades and the
11 bedknife.

12 Bedknives become dulled with use, such as to require periodic
13 sharpening and truing of the surface defining the clearance space
14 with the blades of the reel blade array.

15 Bedknives are mounted to the mower on a pair of pivotal mounts
16 fixed to either end of the ^{bedknives} bedknife. The bedknives clearance is
17 set by a centrally located adjustment attachment, which rotates the
18 bedknife relative to the reel during adjustments, thereby adjusting
19 the cutting clearance.

20 In conventional sharpening apparatus for bed knives, the
21 bedknife blade has its pivots mounted on a pair of opposing aligned
22 centers, clamped to a rail extending parallel to the ways along
23 which the grinding wheel is traversed during grinding. The
24 bedknife is aligned with the axis of motion of a grinding wheel by
25 means of a fixture gauge with one center being adjustably mounted,
26 such as to enable shifting of the axis of the bedknife relative to
27 the grinder ways in order to render the axis extending through the
28 bedknife centers parallel with the grinder ways.

29 A separate center support must be installed afterwards to
30 afford sufficient stiffness of the bedknife during grinding.

31 This manual alignment adjustment is tedious and time
32 consuming, and subject to error. In addition the bedknife often
33 receives a heavy pounding during mowing, such that the pivots on
34 either end often are bent to become substantially out of alignment

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1 with each other. Accordingly, the set up procedure described being
2 dependent on the pivots being aligned is ineffective in such
3 instances.

4 It is the object of the present invention to provide an
5 improved method and apparatus for sharpening bed knives for reel
6 type mowers, which eliminates the need for adjustment of the
7 bedknife supports, which does not depend on the correct alignment
8 of the bedknife pivots and is much less subject to errors in set
9 up.

10 SUMMARY OF THE INVENTION

11 This object and others which will become apparent upon a
12 reading of the following specification and claims is achieved by
13 mounting each of a pair of electromagnets to a respective clamping
14 pedestal, secured at spaced locations to a support rail of a
15 bedknife grinder. Each of the electromagnets has a pair of
16 orthogonal locating surfaces fixed thereto, one surface disposed in
17 a vertical plane, and the other in a horizontal plane. The locator
18 surfaces are ground by traversing the grinder wheel across each
19 surface such as to establish precisely aligned orthogonal surfaces
20 which are parallel to the line of movement of the grinder carriage
21 on its ways.

22 The rear edge and bottom surface of each bedknife is placed in
23 position abutting the respective locating surfaces, and the
24 electromagnets thereafter energized to chuck the bedknife in an
25 accurately aligned position with respect to the grinder axis. The
26 normal sharpening of the bedknife is then carried by traversing the
27 grinder wheel over the edge of the bedknife to be sharpened.

28 It has been determined by the present inventor that the
29 sharpening so conducted and with the bedknife as located in the
30 grinder, achieves a sharpened edge which can be aligned with the
31 mower blades in the mower by adjustment if necessary of the
32 location of pivots at each end of the bedknife such that the
33 sharpened edge can be aligned with the proper clearance established
34 by movement of the center swing arm, notwithstanding that the

1 sharpened edges have not been produced by mounting the bedknife in
2 opposed centers as per the conventional practice.

3 The bedknife can also be secured with mechanical clamps to the
4 locating surfaces as a safety measure.

5 BRIEF DESCRIPTION OF THE DRAWINGS

6 Figure 1 is a perspective view of a bedknife sharpener grinder
7 having a ~~between centers~~ a bedknife mounting arrangement according
8 to the prior practice.

9 Figure 2 is a fragmentary enlarged view of the bedknife
10 grinder shown in Figure 1 having the bedknife ^{mounting} arrangement according
11 to the present invention, installed therein.

12 Figure 3 is a endwise view of a transverse section taken
13 through the bedknife mount support rail, showing ~~the~~ one of the
14 ~~electromagnet~~ bedknife holders shown in Figure 2.

15 Figure 4 is a ^{an} end view of the vertical locator surface,
16 included in the electromagnet holder being ground by a pass of the
17 grinding wheel.

18 Figure 5 is a fragmentary end view of one of the electromagnet
19 bedknife holders showing a grinding of the horizontal locator
20 surface, being ground true by a pass of the grinder.

21 Figure 6 is a perspective fragmentary view of one of the
22 electromagnet bedknife holders with a bedknife installed and ^{using} with
23 ~~an mechanical~~ clamp as a safety measure to hold the bedknife in
24 addition to the electromagnetic hold down forces.

25 DETAILED DESCRIPTION

26 In the following detailed description, certain specific
27 terminology will be employed for the sake of clarity and a
28 particular embodiment described in accordance with the requirements
29 of 35 USC 112, but it is to be understood that the same is not
30 intended to be limiting and should not be so construed inasmuch as
31 the invention is capable of taking many forms and variations within
32 the scope of the appended claims.

33 Referring to Figure 1, a prior art bedknife grinder 10 is

1 depicted in which a bedknife 12 is mounted between centers 14 and
2 16 engaging the pivot points 18 on which the bedknife 12 is
3 supported in the mower. The centers 14, 16 are clamped to a
4 support rail 20 extending parallel to ways 22 on which a grinding
5 motor 24 carriage 25 is traversed by means of a power screw (not
6 shown). In order to properly set up the machine for grinding, the
7 bedknife 12 axis is aligned with the carriage ways 22 by means of
8 a gauge and adjustment of the right hand center 16. This requires
9 a tedious process in preparation for grinding the bedknife 12. In
10 addition if the pivots 18 are bent out of alignment, as they often
11 are, inaccurate results are inevitable.

12 A center support (not shown) must be installed after
13 adjustment to provide a sufficiently rigid support for the bedknife
14 12 to withstand the forces imposed during grinding.

15 Referring to Figure 2, the bedknife holding arrangement
16 according the present invention, consists of a spaced apart pair of
17 electromagnet holders 26, each clamped to the center support rail
18 20. The bedknife 12 is held in the electromagnet holders 26 by
19 electromagnets energized by operation of a switch 28 in the machine
20 control panel 30, connected to the wiring 32 associated with
21 electromagnets in the holders 26.

22 Referring to Figure 3, the details of the electromagnet
23 holders 26 can be seen. Each holder 26 includes an electromagnet
24 34 fixed atop a clamping member 36, having a U shaped portion
25 adapted to receive the support rail 20. A clamping screw 38
26 enables securement of the clamping member 36 in the installed
27 position shown.

28 A set of locating plates are attached to the electromagnet 34
29 including an outer locator plate 40 projecting a short distance
30 above the upper surface of the electromagnet 34. A second locator
31 ^{1/c} plate 42 has its upper surface ~~is~~ affixed to the rear face of the
32 electromagnet 34 having its upper edge flush with the top of the
33 electromagnet 34.

34 According to the concept of the present invention, the rear
35 plate 40 provides a vertical locator surface in which is abutted

1 the bedknife blade 44 while the top of the electromagnet 34 and top
2 edge of the inner locator plate 42 define a horizontal surface on
3 which the bedknife blade 44 is held. The alignment of the
4 respective sets of surfaces with the grinder carriage ways is
5 accurately established by grinding both surfaces after installation
6 of the electromagnetic holders 26 on the rail 20. The grinding
7 wheel 46 of the grinder 24 is set in a vertical position and
8 traversed to pass the face of both rear locator plates 40 as shown
9 in Figure 4 in a single pass.

10 Similarly the top of the electromagnet 34 and inner locator
11 plate 42 of each holder 26 are both ground by traversing the
12 grinding wheel 46 past both surfaces in a single pass with the
13 wheel in a horizontal position.

14 Thus, the respective locator surface sets of the holders 26
15 have their locator surfaces perfectly parallel and aligned with
16 each other and with the grinder carriage way 22.

17 Subsequently, each bedknife 12 to be sharpened need merely be
18 placed in position atop the electromagnetic holders 26 and against
19 the locator surfaces with the blade 44 against the locator
20 surfaces. Energization of the electromagnets 34 securely holds the
21 bedknife 12 in the precisely located position.

22 The grinding wheel 46 is then adjusted to a proper angle in
23 position and traversed along the bedknife edge so as to sharpen the
24 edge in the proper manner. This procedure can be quickly executed
25 such as to speed and simplify the installation process while
26 yielding superior accuracy. It can also be appreciated that the
27 proper alignment of the bedknife pivots 18 does not affect the
28 accuracy of the operation.

29 Subsequently upon installation of the bedknife in the mower,
30 if any out of parallel condition of the bedknife with the mower
31 reel exists, the adjustment of the adjustable center supports can
32 correct the condition.

1 Figure 6 illustrates the use of a clamp 50 which may be used
2 with each electromagnet holder 26 to provide a ~~additional hold down~~
3 of the bedknife 12 against the locator plates 40, 42 atop the
4 electromagnet 34 as a safety measure against the failure of the
5 electromagnet 34 or the inadvertent switching off during operation
6 of the bedknife grinder.